NON-PUBLIC?: N
ACCESSION #: 9105030252
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Arkansas Nuclear One, Unit One PAGE: 1 OF 04

DOCKET NUMBER: 05000313

TITLE: Automatic Reactor Trip Due To A Main Turbine Trip Which Was Caused By Failure Of The Turbine Generator Exciter
EVENT DATE: 01/10/91 LER #: 91-001-01 REPORT DATE: 04/29/91

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: N POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION:
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: Richard H. Scheide, Nuclear Safety and Licensing Specialist TELEPHONE: (501) 964-5000

COMPONENT FAILURE DESCRIPTION:
CAUSE: SYSTEM: COMPONENT: MANUFACTURER:
REPORTABLE NPRDS:

SUPPLEMENTAL REPORT EXPECTED: No

ABSTRACT:

On January 10, 1991, at approximately 2326, with the plant at 100 percent of rated power, a reactor trip occurred as a result of the main turbine tripping due to loss of field excitation to the main generator. An anticipatory Reactor Protection System (RPS) trip was initiated, as designed, when the main turbine tripped while reactor power was greater than 43 percent. Plant response to the trip was as expected. Reactor Coolant System (RCS) pressure decreased to 1828 psig and was quickly recovered into the post trip window. Minimum post trip RCS temperature was 553 degrees. A temporary exciter was installed while the plant remained in the hot shutdown condition and the reactor was returned to power on January 17, 1991. The temporary exciter was replaced with a permanent exciter during mid cycle outage 1M91, which began on April 7, 1991. The cause of the exciter failure was inadequate cleanliness/material accountability controls. Strengthened controls were

implemented during the permanent exciter installation.

END OF ABSTRACT

A. Plant Status

At the time of this event, Arkansas Nuclear One, Unit 1 (ANO-1) was operating at approximately 100 percent of rated power. Reactor Coolant System (RCS) AB! average temperature was 579 degrees and RCS pressure was approximately 2153 psig. No major equipment was out of service.

B. Event Description

On January 10, 1991, at approximately 2326, an automatic reactor trip occurred as a result of the main turbine TA! tripping due to loss of field excitation to the main generator EL!. An anticipatory Reactor Protection System (RPS) JC! trip was initiated, as designed, when the main turbine tripped while reactor power was greater than 43 percent.

Plant response to the trip was as expected. RCS pressure decreased to 1828 psig and was quickly recovered into the post trip window. Minimum post trip RCS temperature was 553 degrees. The Integrated Control System (ICS) JA! initiated a runback of the 'A' and 'B' main feedwater pumps (MFPs). Fifteen of the sixteen main steam safety valves (MSSVs) opened to relieve the excess steam pressure/RCS energy. All MSSVs which opened reseated properly. Forced flow was maintained with all four (4) reactor coolant pumps operating. The ability to remove heat from the RCS was maintained by the use of the turbine bypass valves.

Approximately 30 minutes after the trip, the 'B' MFP was secured and the auxiliary feedwater pump (P-75) was placed in service. After placing P-75 in service, the 'A' MFP was secured. The plant was maintained at hot shutdown conditions while an investigation was conducted to determine the cause of the exciter problem.

No equipment malfunctions or failures were noted that complicated the plant recovery effort. Additionally, no procedural or operator inadequacies were found as transient response was in a timely and professional manner.

C. Root Cause

An evaluation was conducted by the vendor (Westinghouse) which concluded that the most likely cause of the exciter failure was the presence of a foreign object in the exciter which created a short circuit between the diode heat sink (AC potential) and the diode wheel fuse rim (DC potential). The resultant short circuit current generated sufficient heating to melt the aluminum heat sinks causing the loss of the exciter field relay and a subsequent main generator/reactor trip. It is not known when the foreign object was introduced into the exciter.

The root cause of this event is considered to be inadequate material accountability and cleanliness controls regarding the turbine generator/exciter.

D. Corrective Actions

A temporary exciter was installed and the reactor was returned to power on January 17, 1991.

The temporary exciter was replaced with a permanent exciter during mid cycle outage 1M91, which began on April 7, 1991. During the installation, additional controls were implemented to ensure that cleanliness and material accountability were maintained. These controls included:

o Around the clock ANO System Engineering supervisory interface.

o Strengthened material accountability controls which included the establishment of a security fence around the exciter work area. This fence had only one entrance at which all materials entering and leaving the area were logged and accounted for.

o Work was accomplished using a detailed job order package which included Quality Control (QC) hold points and required periodic inspections and signoffs by vendor as well as ANO System Engineering and QC personnel.

E. Safety Significance

The RPS initiated a reactor trip due to the main turbine tripping while reactor power was greater than 43 percent, as designed. The plant response to the transient was as expected, with no major complications, and normal post trip parameters were maintained.

Therefore, there was no safety significance associated with this event.

F. Basis For Reportability

This event is reportable pursuant to 10CFR50.73(a)(2)(iv) since an automatic reactor trip was initiated by the RPS.

This event was also reported in accordance with 10CFR50.72 at 0147 on January 11, 1991.

G. Additional Information

A similar event in which a reactor trip was caused by a main generator exciter failure was reported in LER 50-313/89-002-00.

Energy Industry Information System (EIIS) codes are indicated in the text as XX!.

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April 29, 1991

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SUBJECT: Arkansas Nuclear One - Unit 1
Docket No. 50-313
License No. DPR-51
Licensee Event Report 50-313/91-001-01

Gentlemen:

In accordance with 10CFR50.73(a)(2)(iv), attached is a supplement to the subject report concerning an automatic reactor trip due to a main turbine trip which was caused by failure of the turbine generator exciter.

This supplement is being submitted to provide the results of the root cause evaluation of the exciter failure.

Very truly yours,

James J. Fisicaro
Director, Licensing

JJF/RHS/mmg
Attachment
cc: Regional Administrator
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